REMARKS

Applicant adds new claim 13; therefore, claims 1-13 are now pending in the application.

The Examiner rejects:

- claims 1-12 under 35 U.S.C. § 112, second paragraph, due to allegedly indefinite recitations in independent claims 1 and 6;
- claim 1 under 35 U.S.C. § 102(b) as being anticipated by Paoli; and
- claims 2-12 under 35 U.S.C. § 103(a) as being unpatentable over Paoli in view of Coman et al. (Coman).

Also, the Examiner objects to claim 1 as allegedly being in improper format, and advises that claims 2 and 3 are duplicative of claim 4, claims 7 and 8 are duplicative of claim 10, and claim 11 is duplicative of claim 9.

With regard to the Examiner's § 112, second paragraph, rejection of claims 1-12 and objection to claim 1, these are believed to be overcome by the claim amends set forth above. The amendments are merely clarifying amendments, and do not narrow the scope of the original claims. No estoppel is created.

Also, Applicant amends the specification to correct minor inconsistencies in the terminology, and adds new independent claim 13 more positively to recite some of the features of a multiple wavelength surface-emitting laser device according to an embodiment of the invention.

With regard to the Examiner's allegation that some of the dependent claims are duplicative, Applicant respectfully disagrees. For example, claims 2 and 3 individually do not include all of the features recited in claim 4, and thus provide varying scope of coverage. Furthermore, the combination of features recited in claim 3 (which incorporates, by reference,

the features of its base claim 1 and intervening claim 2) is not duplicative of claim 4 (which depends from claim 1 directly). The same is true for claims 7 and 8 as compared to claim 10, and for claim 9 as compared to claim 11. Therefore, should claims 4, 9 and 10 be deemed allowable, claims 2, 3, 7, 8 and 11 should not be objected to under 37 C.F.R. § 1.75.

With regard to the prior art rejections, Applicant respectfully traverses these rejections as follows.

Applicant's invention defines a unique combination of features (claims 1-5) and method steps (claims 6-12) including, *inter alia*, a dielectric reflection layer where dielectric materials with different refractive indexes are alternately layered on the intermediate layer and the top electrode to be dielectric layers of a thickness suitable for a desired resonance wavelength, whereby the desired resonance wavelength is controlled by adjusting the thickness of the dielectric layers of the dielectric reflection layer (see Applicant's independent claims 1 and 6).

That is, one of the features of Applicant's claimed invention is that a plurality of surface emitting lasers are configured to a desired resonance wavelength by adjusting the thickness of the dielectric layers of the dielectric reflection layer. In contrast, the dual wavelength surface emitting laser of Paoli has a structure in which the active and spacer layers of two laser cavities are optimized for each wavelength and the thickness of the spacer layers are adjusted, as described at col. 4, line 64 through col. 5, line 2. Thus, Paoli does not disclose, and is incapable of suggesting, a device or a method where the thickness of the dielectric layers of the dielectric reflection layer is adjusted to control the desired resonance wavelength.

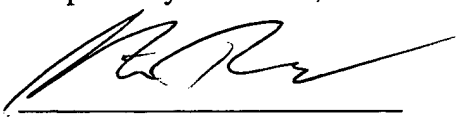
Accordingly, Applicant's independent claim 1 is not anticipated by (i.e., is not readable on) Paoli at least for this reason.

Coman does not supply the above-noted deficiency of Paoli with regard to claim 1, and likewise, the independent claim 6. In fact, while Coman describes various dielectric compounds, Coman does not even disclose forming a plurality of surface-emitting lasers on an intermediate layer. Thus, Applicant's independent claim 6, as well as the dependent claims 2-8 and 7-12 (which incorporate all the novel and unobvious features of their respective base claims) would not have been obvious from any reasonable combination of Paoli and Coman.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned attorney at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The specification is changed as follows:

Page 4, delete the sixth paragraph and insert

FIG. 3 is a graph illustrating change of resonance wavelength according to change in the thickness of the dielectric [reflection] layer in FIG. 2; and

Page 7, delete the first paragraph and insert

In Table 1, Nos. 1-6 correspond to the bottom reflection layer 21, Nos. 7-13 to the active layer 23, Nos. 14-21 to the intermediate layer 25, and Nos. 22-24 to the dielectric reflection layers 31 and 41. The semiconductor layer of Nos. 1-4 in the bottom reflection layer 21 is layered 40 times, the semiconductor layer of No. 9-10 in the active layer 23 is layered twice, and the dielectric [body] layer of Nos. 22-23 in the dielectric reflection layers 31 and 41 is layered 7 times. No. 21 in the intermediate layer 25 shows the cap layer 26.

Page 9, delete the third paragraph and insert:

By the way, as can be seen in Table 1, φ_b, σ, and a part of φ_a excluding the part that is determined by the dielectric reflection layer 31 and 41 are already defined with respect to the bottom reflection layer 21, the active layer 23 and the intermediate layer 25 that are applied commonly to all surface-emitting lasers constituting multiple wavelength surface-emitting laser devices that are manufactured by MOCVD and/or MBE processes. Thus if the phase φ_a of the light reflected by the dielectric reflection layer 31 or 41 which occupies the larger part of the role of the top reflection layer changes, then the resonance condition changes. Here, since the phase

φ_a of the light reflected by the dielectric reflection layer 31 or 41 changes depending on the thickness of a plurality of dielectric [body] layers, the change in the total thickness of the composite dielectric [body] layer makes the resonance wavelength change.

Page 12, delete the first paragraph and insert

According to the present invention as described above, the resonance wavelength is controlled by adjusting the thickness of the dielectric [reflection] layer, and thus a multiple wavelength surface-emitting laser device that emits light of a desired wavelength from each of a plurality of surface-emitting lasers can be manufactured in a continuous process, which is simple and has high reliability.

IN THE CLAIMS:

The claims are amended as follows:

1. (Amended) A multiple wavelength surface-emitting laser device comprising:

a substrate; and

a plurality of surface-emitting lasers that are formed on the substrate by a continuous manufacturing process,

wherein each of said plurality of surface-emitting lasers comprises:

a bottom reflection layer on the substrate, that is doped with impurities of a first type and that is composed of alternating semiconductor material layers having different refractive indexes;

an active layer on the bottom reflection layer;

an intermediate layer that is doped with impurities of a second type on the active layer;

a top electrode [that is formed] on the intermediate layer [to have], said top electrode having a window through which light is emitted; and

a dielectric reflection layer where dielectric materials with different refractive indexes are alternately layered on the intermediate layer and the top electrode to be dielectric layers of a thickness suitable for a desired resonance wavelength, [which] whereby the desired resonance wavelength is controlled by adjusting the thickness of the dielectric layers of the dielectric reflection layer.

6. (Amended) A method of manufacturing a multiple wavelength surface-emitting laser device comprising the steps of

sequentially forming, on a prepared substrate, a bottom reflection layer, that is doped with impurities of a first type and composed of alternating semiconductor material layers having different refractive indexes, an active layer and an intermediate layer that is doped with impurities of a second type;

forming an arrangement of a plurality of surface-emitting lasers by removing the intermediate layer, the active layer and a part of the bottom reflection layer by etching;

forming on the intermediate layer of each surface-emitting laser a top electrode having a window through which light is emitted; and

forming on at least one of the intermediate layer and the top electrode of each surface-emitting laser, a dielectric reflection layer where different dielectric materials are alternately layered to be dielectric layers of a thickness suitable for a desired resonance wavelength, whereby the desired resonance wavelength is controlled by adjusting the thickness of the dielectric layers of the dielectric reflection layer.